What is claimed is:

1. A signal processing method for a digital signal comprising the steps of:

establishing a Yule-Walker equation having the following form by using a matrix that includes, as components, the elements of a Galois field GF(2^m), and a vector that includes, as components, said elements of said Galois field GF(2^m)

$$\begin{pmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ S_1 & S_2 & \cdots & S_l \\ \vdots & & \ddots & \vdots \\ S_{l-1} & S_l & \cdots & S_{2l-2} \end{pmatrix} \begin{pmatrix} \Lambda_l^{(l)} \\ \vdots \\ \vdots \\ \Lambda_1^{(l)} \end{pmatrix} = \begin{pmatrix} S_l \\ \vdots \\ \vdots \\ S_{2l-1} \end{pmatrix};$$

obtaining the solution of said Yule-Walker equation as the following determinants

$$\tilde{\Lambda}_i^{-(l)} = \begin{vmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ \vdots & \cdots & \ddots & \vdots \\ S_{l-i-1} & S_{l-i} & \cdots & S_{2l-i-2} \\ S_{l-i+1} & S_{l-i+2} & \cdots & S_{2l-i} \\ \vdots & \cdots & \ddots & \vdots \\ S_l & S_{l+1} & \cdots & S_{2l-1} \end{vmatrix}, i=1, \ldots, l-1 ;$$

employing Jacobi's formula, $\Gamma_i^{(l+1)}\Lambda_0^{hat(l)}+(\Lambda_i^{hat(l)})^2=\Lambda_0^{hat(l+1)}\Gamma_i^l$, to enable the calculation of the solution $\tilde{\Lambda}_i^{(l)}$ (hereinafter referred to as $\Lambda_i^{nat(l)}$) to result in the calculation of the following determinants of the symmetric matrices

$$\Gamma_{i}^{(l+1)} = \begin{vmatrix} S_0 & \cdots & S_{l-1-i} & S_{l+1-i} & \cdots & S_l \\ \vdots & & \vdots & \vdots & & \vdots \\ S_{l-1-i} & \cdots & S_{2(l-1-i)} & S_{2(l-i)} & \cdots & S_{2l-1-i} \\ S_{l+1-i} & \cdots & S_{2(l-i)} & S_{2(l+1-i)} & \cdots & S_{2l+1-i} \\ \vdots & & \vdots & \vdots & & \vdots \\ S_l & \cdots & S_{2l-1-i} & S_{2l+1-i} & \cdots & S_{2l} \end{vmatrix}$$

(where i = 0, . . ., l);

determining the number of errors to be the maximum matrix size that corresponds to said obtained solution that is not zero; and

determining whether said number of errors equals the maximum number of correctable errors.

2. The signal processing method according to claim 1, wherein the components of said determinant are syndromes that include said elements of said Galois field $GF(2^m)$.

3. The signal processing method according to claim 1, wherein said syndromes are generated by digital signals transmitted using wavelength division multiplexing.

4. The signal processing method according to claim 1 that is used for at least one of the decoding of digital signals and error correction.

5. A system for processing a digital signal comprising:

an encoding unit, for encoding a received digital signal;

a decoding unit, for decoding said digital signal that is encoded; and

an output unit, for outputting said decoded digital signal,

wherein said decoding unit includes

means for establishing a Yule-Walker equation having the following form by using a matrix that includes, as components, the elements of a Galois field $GF(2^m)$, and a vector that includes, as components, said elements of said Galois field $GF(2^m)$

$$\begin{pmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ S_1 & S_2 & \cdots & S_l \\ \vdots & & \ddots & \vdots \\ S_{l-1} & S_l & \cdots & S_{2l-2} \end{pmatrix} \begin{pmatrix} \Lambda_l^{(l)} \\ \vdots \\ \vdots \\ \Lambda_1^{(l)} \end{pmatrix} = \begin{pmatrix} S_l \\ \vdots \\ \vdots \\ S_{2l-1} \end{pmatrix},$$

means for obtaining the solution of said Yule-Walker equation as the following determinants

$$\tilde{\Lambda}_i^{-(l)} = \begin{vmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ \vdots & \cdots & \ddots & \vdots \\ S_{l-i-1} & S_{l-i} & \cdots & S_{2l-i-2} \\ S_{l-i+1} & S_{l-i+2} & \cdots & S_{2l-i} \\ \vdots & \cdots & \ddots & \vdots \\ S_l & S_{l+1} & \cdots & S_{2l-1} \end{vmatrix}, \; i=1,\ldots,l-1,$$

means for employing Jacobi's formula, $\Gamma_i^{(l+1)}\Lambda_0^{hat(l)}+(\Lambda_i^{nat(l)})^2=\Lambda_0^{hat(l+1)}\Gamma_i^l$, to enable the calculation of the solution $\tilde{\Lambda}_i^{(l)}$ (hereinafter referred to as $\Lambda_i^{hat(l)}$) to result in the calculation of the following determinants of the symmetric matrices

$$\Gamma_i^{(l+1)} = \begin{vmatrix} S_0 & \cdots & S_{l-1-i} & S_{l+1-i} & \cdots & S_l \\ \vdots & & \vdots & \vdots & & \vdots \\ S_{l-1-i} & \cdots & S_{2(l-1-i)} & S_{2(l-i)} & \cdots & S_{2l-1-i} \\ S_{l+1-i} & \cdots & S_{2(l-i)} & S_{2(l+1-i)} & \cdots & S_{2l+1-i} \\ \vdots & & \vdots & \vdots & & \vdots \\ S_l & \cdots & S_{2l-1-i} & S_{2l+1-i} & \cdots & S_{2l} \end{vmatrix}$$

(where i = 0, . . ., l),

means for determining the number of errors to be the maximum matrix size that corresponds to said obtained solution that is not zero, and

means for determining whether said number of errors equals the maximum number of correctable errors.

6. The system according to claim 5, wherein said encoding unit is configured for encoding said received digital signal to syndromes that consist of said elements of said Galois field GF(2^m).

7. The system according to claim 5, wherein said received digital signals are transmitted using wavelength division multiplexing.

8. The system according to claim 5 that is used for at least one of the decoding of digital signals and error correction.

9. A program for processing a digital signal, permitting a computer to perform the steps of:

establishing a Yule-Walker equation having the following form by using a matrix that includes, as components, the elements of a Galois field GF(2^m), and a vector that includes, as components, said elements of said Galois field GF(2^m)

$$\begin{pmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ S_1 & S_2 & \cdots & S_l \\ \vdots & & \ddots & \vdots \\ S_{l-1} & S_l & \cdots & S_{2l-2} \end{pmatrix} \begin{pmatrix} \Lambda_l^{(l)} \\ \vdots \\ \vdots \\ \Lambda_1^{(l)} \end{pmatrix} = \begin{pmatrix} S_l \\ \vdots \\ \vdots \\ S_{2l-1} \end{pmatrix};$$

obtaining the solution of said Yule-Walker equation as the following determinants

$$\tilde{\Lambda}_i^{-(l)} = \begin{vmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ \vdots & \cdots & \ddots & \vdots \\ S_{l-i-1} & S_{l-i} & \cdots & S_{2l-i-2} \\ S_{l-i+1} & S_{l-i+2} & \cdots & S_{2l-i} \\ \vdots & \cdots & \ddots & \vdots \\ S_l & S_{l+1} & \cdots & S_{2l-1} \end{vmatrix}, \quad i=1,\ldots,l-1;$$

employing Jacobi's formula, $\Gamma_i^{(l+1)}\Lambda_0^{hat(l)}+(\Lambda_i^{hat(l)})^2=\Lambda_0^{hat(l+1)}\Gamma_i^l$, to enable the calculation of the solution $\tilde{\Lambda}_i^{(l)}$ (hereinafter referred to as $\Lambda_i^{hat(l)}$) to result in the calculation of the following determinants of the symmetric matrices

$$\Gamma_i^{(l+1)} = \begin{vmatrix} S_0 & \cdots & S_{l-1-i} & S_{l+1-i} & \cdots & S_l \\ \vdots & & \vdots & \vdots & & \vdots \\ S_{l-1-i} & \cdots & S_{2(l-1-i)} & S_{2(l-i)} & \cdots & S_{2l-1-i} \\ S_{l+1-i} & \cdots & S_{2(l-i)} & S_{2(l+1-i)} & \cdots & S_{2l+1-i} \\ \vdots & & \vdots & \vdots & & \vdots \\ S_l & \cdots & S_{2l-1-i} & S_{2l+1-i} & \cdots & S_{2l} \end{vmatrix}$$

(where i = 0, . . ., l);

determining the number of errors to be the maximum matrix size that corresponds to said obtained solution that is not zero; and

determining whether said number of errors equals the maximum number of correctable errors.

10. The program according to claim 9, wherein the components of said determinants are syndromes that consist of said elements of said Galois field GF(2^m).

11. The program according to claim 9, wherein said syndromes are generated by digital signals transmitted using

wavelength division multiplexing.

12. The program according to claim 9 that is used for at least one of the decoding of digital signals and error correction.

13. A computer-readable storage medium on which is recorded a program used for an error correction method, said program permitting a computer to perform the steps of:

establishing a Yule-Walker equation having the following form by using a matrix that includes, as components, the elements of a Galois field GF(2^m), and a vector that includes, as components, said elements of said Galois field GF(2^m)

$$\begin{pmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ S_1 & S_2 & \cdots & S_l \\ \vdots & & \ddots & \vdots \\ S_{l-1} & S_l & \cdots & S_{2l-2} \end{pmatrix} \begin{pmatrix} \Lambda_l^{(l)} \\ \vdots \\ \vdots \\ \Lambda_1^{(l)} \end{pmatrix} = \begin{pmatrix} S_l \\ \vdots \\ \vdots \\ S_{2l-1} \end{pmatrix};$$

obtaining the solution of said Yule-Walker equation as the following determinants

$$\tilde{\Lambda}_i^{-(l)} = \begin{vmatrix} S_0 & S_1 & \cdots & S_{l-1} \\ \vdots & \cdots & \ddots & \vdots \\ S_{l-i-1} & S_{l-i} & \cdots & S_{2l-i-2} \\ S_{l-i+1} & S_{l-i+2} & \cdots & S_{2l-i} \\ \vdots & \cdots & \ddots & \vdots \\ S_l & S_{l+1} & \cdots & S_{2l-1} \end{vmatrix}, i=1, \ldots, l-1;$$

employing Jacobi's formula, $\Gamma_i^{(l+1)}\Lambda_0^{hat(l)}+(\Lambda_i^{hat(l)})^2=\Lambda_0^{hat(l+1)}\Gamma_i^l$, to enable the calculation of the solution $\tilde{\Lambda}_i^{(l)}$ (hereinafter referred to as $\Lambda_i^{hat(l)}$) to result in the calculation of the following determinants of the symmetric matrices

$$\Gamma_i^{(l+1)} = \begin{vmatrix} S_0 & \cdots & S_{l-1-i} & S_{l+1-i} & \cdots & S_l \\ \vdots & & \vdots & \vdots & & \vdots \\ S_{l-1-i} & \cdots & S_{2(l-1-i)} & S_{2(l-i)} & \cdots & S_{2l-1-i} \\ S_{l+1-i} & \cdots & S_{2(l-i)} & S_{2(l+1-i)} & \cdots & S_{2l+1-i} \\ \vdots & & \vdots & \vdots & & \vdots \\ S_l & \cdots & S_{2l-1-i} & S_{2l+1-i} & \cdots & S_{2l} \end{vmatrix}$$

(where i = 0, . . ., l);

determining the number of errors to be the maximum matrix size that corresponds to said obtained solution that is not zero; and

determining whether said number of errors equals the maximum number of correctable errors.

14. The storage medium according to claim 13, wherein the components of said determinants are syndromes that consist of said elements of said Galois field GF(2^m).

15. The storage medium according to claim 13, wherein said syndromes are generated by digital signals transmitted using wavelength division multiplexing.

16. The storage medium according to claim 13, wherein said program is used for at least one of the decoding of digital signals and error correction.